Modeling Capacity-related Factors in a Theme Park Context

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ABSTRACT

A comprehensive analysis among theme park capacity and all its factors is lacked in existing tourism research. Based on a case study of a Chinese theme park, this paper explores the factors that affect theme park's capacity and the relationships among them. Two models on theme park attendance-related factors and experience-related factors were built based on empirical tests and previous studies. Attendance, waiting time and tourist satisfaction were found to be closely related to each other. Tolerable waiting time, visitors' expectation on the number and experience value of attractions visited can be effective indicators used to determine appropriate capacity of theme park. In the end, this paper conceptualized a comprehensive model of the relationships among theme park attendance, capacity, visitor waiting time, expectation on experience, satisfaction, and other related variables, based on the research findings and literature review.

Keywords: *tourism capacity, waiting time, theme park,* attendance, *tourist satisfaction, expectation on experience*

INTRODUCTION

Previous studies have identified a number of factors affecting a theme park's capacity. For instance, it has been suggested that the number of theme park visitors affects their waiting time, whereas visitors' waiting time affects their satisfaction level (Liang 2009; Zhang, et al. 2012). Tourist satisfaction has been known to affect tourists' word-of-mouth and revisit intention (Yoon and Uysal 2005). Further, the mean of attendees' maximum tolerable waiting time can be used to determine a theme park's capacity (Zhang, et al. 2012). Reducing attendees' actual and perceived waiting time are two important ways to increase a theme park's capacity without lowering visitors' level of satisfaction (Lith 2000; Hege, et al. 2009). On the other hand, the expected number and the experience quality of attractions visited have also been suggested to

affect visitor satisfaction (Ahmadi 1997; Lees-Miller, et al. 2009; Zhang, et al. 2012; Li et al. 2011). However, a systematic exploration of the relationships among theme park attendance, visitor waiting time, experience expectation, satisfaction, and other related variables is still lacking. In this paper, the authors attempt to explore and model the relationships among key factors relating to a theme park's capacity.

METHODOLOGY

Correlation analysis, regression analysis and system dynamics methods (Kirkwood 1998) were used to explore the relationships among capacity-related variables. Data used in the study were retrieved from a survey conducted in a Chinese theme park in 2010, and official statistics reported by the local tourism bureau. A total of 1,619 valid questionnaires were collected in the survey. Random visitors who just finished their tour were asked to complete the questionnaires near the park exit. Most of the variables measured in the survey were operationalized based on the literature (Ahmadi 1997; Cope III, Cope, and Davis 2008; Hege, et al. 2009; Lees-Miller, et al. 2009; Liang 2009; Lith 2000; Lutz 2008; Norman 2009; Tibben-Lembke 2007; Yoon and Uysal 2005).

PRELIMINARY RESULT

Based on literature review, a correlation analysis was conducted among theme park attendance, and variables associated with attendance, such as waiting time (average number of minutes tourists spent on waiting during their visit), wait proportion (the ratio of attendees' waiting time to their total time in the park), number of attractions visited (average number of attractions visited by an attendee), tourist satisfaction, recommendation intention, and revisit intention. The result indicates significant correlations among most variables. Independent samples t tests show significant differences between busy and less busy days in terms of mean waiting time, wait proportion, number of attractions visited, tourist satisfaction, recommendation intention and revisit intention. Linear, logarithmic, quadratic, power, and exponential regression functions were tested for each pair of related variables. A model on theme park attendance-related factors is depicted as a causal loop diagram drawn by Vensim, based on the above results. This model includes a positive and a negative reinforcement loop, showing the influences of attendance on waiting time, wait proportion, number of attraction visited, tourist satisfaction, recommendation intention, and revisit intention.

Attendee experience with attractions (e.g. rides, shows) was explored using experience value (attendee's evaluation on the experience quality of an attraction), waiting time, tolerable waiting time (customers' maximum tolerable waiting time for an attraction), and attendee satisfaction with each attraction. Partial correlation analyses show attendee satisfaction with attractions is highly associated with both experience value and waiting time of attractions. A linear regression analysis indicates attraction experience value and waiting time both affect attendee satisfaction. Attraction waiting time can offset more than half of the positive influence of attraction experience value on attendee satisfaction. A correlation analysis suggests significant positive correlations among experience value, tolerable waiting time, and waiting time of rides. A model of theme park experience-related factors was established based on the above analyses, with several additional factors included as suggested by previous studies (Zhang et al. 2013; Maister 1985; Luo and Liao 2010).

CONCLUSION

Two models on theme park attendance-related factors and experience-related factors were built based on empirical tests and previous studies. Attendance, waiting time and tourist satisfaction were found to be closely related to each other. Tolerable waiting time, visitors' expectation on the number and experience value of attractions visited can be effective indicators used to determine appropriate capacity of theme park. Other factors of theme park capacity were also identified.

Further, a more comprehensive model of the relationships among theme park attendance, capacity, visitor waiting time, expectation on experience, satisfaction, and other related variables was conceptualized. The present study only tested a small portion of the model, and future research will help draw a bigger picture of key factors determining theme park capacity management.

REFERENCES

Ahmadi, R. H. (1997). Managing Capacity and Flow at Theme Parks. *Zor Methods And Models Of Operations Research*, 45 (1): 1-13.

Cope III, R. F., R. F. Cope, and H. E. Davis. (2008). Disney's Virtual Queues: A Strategic Opportunity To Co-Brand Services? *Journal of Business & Economics Research*, 6 (10): 13-20.

Hege, C., S. Offermans, and J. Frens. (2009). Waiting as Part of the Fun: Interactive Gaming in Theme Park Queues. In *Proceedings of SIDeR '09*. Eindhoven University of Technology, Eindhoven.

Kirkwood, C.W. (1998). System Dynamics Methods: A quick introduction. College of Business, Arizona State University, Original material copyright. http://nutritionmodels.tamu.edu/copyrighted_papers/Kirkwood1998.pdf

Lees-Miller, J., J. Hammersley, and N. Davenport. (2009). Ride Sharing in Personal Rapid Transit Capacity Planning. In *Proceedings of the Twelfth International Conference, Atlanta, GA.*. Atlanta.

Li, X., C. Lai, R. Harrill, S. Kline, and L. Wang. (2011). When East Meets West: An Exploratory Study on Chinese Outbound Tourists' Travel Expectations. *Tourism Management*, 32 (4): 741-749.

Liang, Z. (2009). A Study on the Curve of Tourist Psychological Capacity in Theme Park: the Case of Happy Valley in Shenzhen, Management School, Jinan University, Guangzhou, China.

Lith, P. V., ed. (2000). Queue Management. http://multimotions.websystems.nl/docs/art_tile_2000.PDF.

Luo, F., and W. Liao. (2010). "Visitors' Wait Psychological Change for Theme Park Recreational Facilities: A Case Study of The Window of The World, Changsha." *Journal of Central South University of Forestry & Technology (Social Sciences)*, 4 (3): 51-54.

Lutz, H. (2008). The Impact of Virtual Queues for Amusement Parks. In *Proceedings of the 39th Annual Meeting of the Decision Sciences Institute*. Atlanta.

Maister, D.H. (1985). The Psychology of Waiting Lines. In *The Service Encounter: Managing Employee/customer Interaction in Service Businesses*, edited by J. A. Czepiel, M. R. Solomon and C. F. Surprenant. Lexington, MA: D. C. Heath and Company.

Norman, D. A. (2009). Designing Waits That Work. *MIT Sloan Management Review*, 50 (4): 22-28.

Tibben-Lembke, R.S. (2007). Maximum Happiness: Amusement Park Rides as Closed Queueing Networks. *Management Science*. http://www.business.unr.edu/faculty/ rtl/summer07/MS-happiness16.pdf.

Yoon, Y., and M. Uysal. (2005). An Examination of the Effects of Motivation and Satisfaction on Destination Loyalty: a structural model. *Tourism Management*, 26 (1): 45-56.

Zhang, Y., Q. Su, and X. Hu. (2012). Study on the Capacity of Fantawild Adventure Theme Park Based on Queuing Theory. *Tourism Tribune*, 27 (1): 66-72.

Zhang, Y., Q. Su, X. Li, and X. Hu. (2013). Optimizing Theme Park Capacity through Spatial Design: A Case Study of Wuhu Fantawild Adventure in China. In *Graduate Education and Graduate Student Research Conference in Hospitality and Tourism*. Seattle, Washington.